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ABSTRACT

This manual contains examples of techniques for science teachers to use in making the teaching of reading a simultaneous function of teaching science. The task force members of a three day work session with the Alaska Department of Education used science texts from their own programs to provide samples of various activities and guides. Each section begins with an explanation of the technique in that section. The readability graph developed by Edward Fry at Rutgers University is presented with directions for its use. Sample science textbook usability checklists are included with four categories that aid the teacher in selecting texts. A simplified technical vocabulary analysis chart allows the science teacher to plan for teaching technical vocabulary and skills at the same time. Sample concept guides illustrate the technique of determining major concepts that students should acquire and listing them in short phrases. Students then can select statements which underlie the major concepts. Teachers are guided in analyzing a passage to determine a pattern of organization which supports the major concepts. Students later will be expected to indicate whether statements actually occurred in the passage and must identify the major concept supported by the statement. Samples in science comprehension and vocabulary reinforcement help teachers guide students in interacting with important technical terms. (SA)

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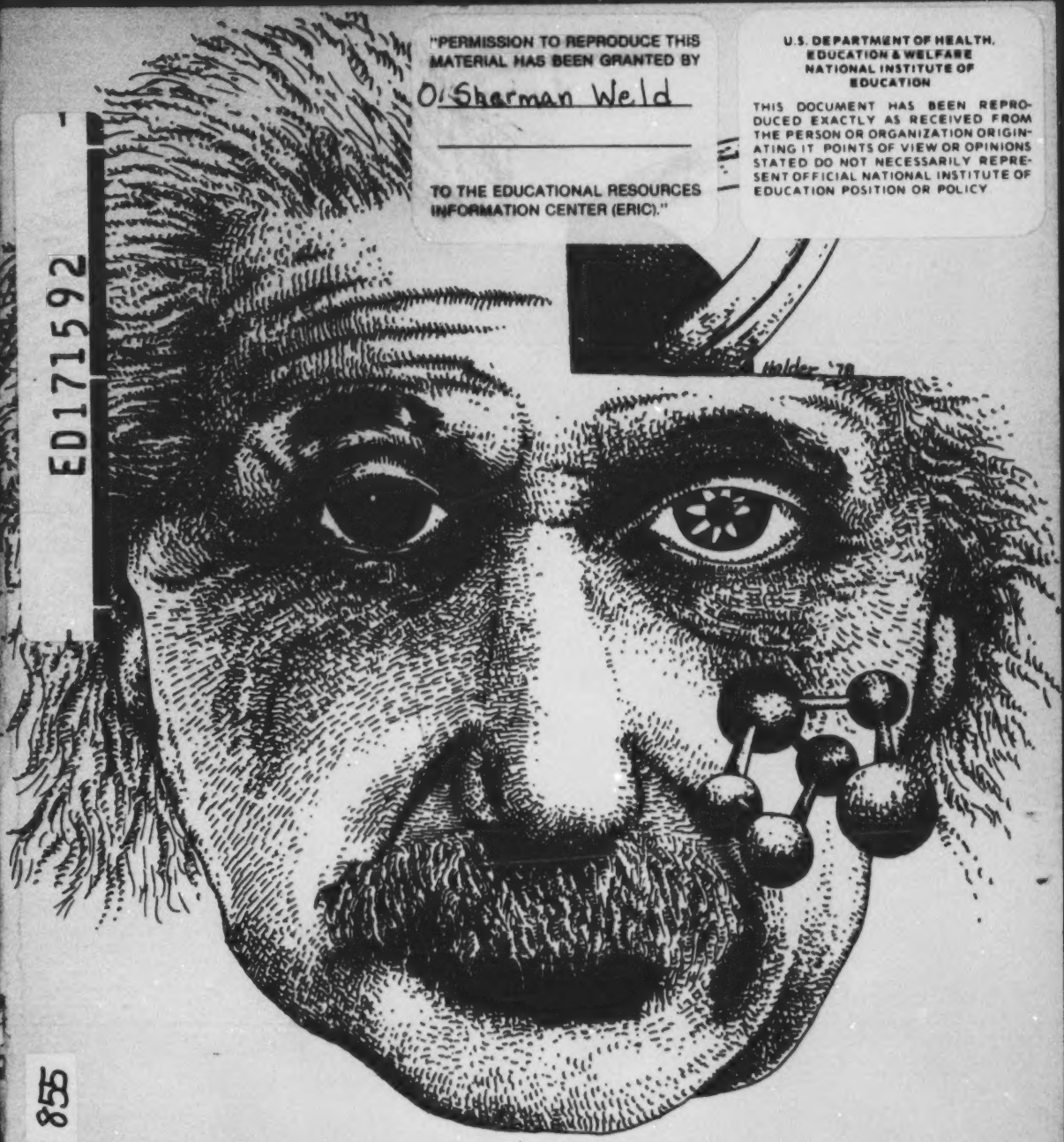

SE 027 855

SCIENCE | READING

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SCIENCE/READING

Developed by:

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October 1978

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Introduction

On June 6-8, 1978, the program development and dissemination unit of the Alaska Department of Education set up a Science/Reading Task Force meeting to accomplish the following goals:

1. Provide an example set of tools for teaching science content and reading process simultaneously.
2. Provide a group of science teachers in Alaska with science/reading expertise.
3. Provide the Alaska Talent Bank with more resource people in the science/reading Area.

The Science/Reading Task Force was provided impetus by requests from the field, chiefly from Kathy Wayne of Wrangell City Schools and Jim Gorman, Alaska linker of the Northwest Reading Consortium. This effort was funded by the Alaska Talent Bank – Vern Williams, administrator. The task force was coordinated by Dick Luther and Dave Forbes of the program development and dissemination unit of the Alaska Department of Education.

The task force members who created the following examples are:

Rod Brown, Science Teacher
Wrangell High School

Jan Wallace, Science Teacher
Kenai Junior High School

Cathleen Chmielowski, Science Teacher
North Pole Junior/Senior High School

In the formation of the Science/Reading Task Force the following school districts were asked to provide information on science texts in use in the district and on people who might be interested in working on the project:

Anchorage School District
Fairbanks North Star Borough School District
City & Borough of Juneau School District
Kenai Peninsula Borough School District
Matanuska-Susitna Borough School District

These districts responded with a list of science texts and names of individuals to work on the task force.

During the three-day work session, each participant received training in content reading techniques. The guides in this manual are workshop products of that training.

The task force members brought science texts from their programs to use for providing samples of the various guides and activities.

The following texts were used in the project:

Natural World / I -- Silver Burdett
Natural World / II -- Silver Burdett
BSCS Green Version, 4th ed. & 2nd ed. – Rand McNally
Biological Science: An Inquiry
Into Life (BSCS) -- Harcourt, Brace, Jovanovich
Investigating the Earth -- Houghton Mifflin

The contents of the science/reading specimen set are examples to provide science teachers with direction in making the teaching of reading a simultaneous function of teaching science.

The task force's final product is organized into the following sections:

I. Science Textbook Readability/Usability Checklist

II. Simplified Technical Vocabulary Analysis Chart

III. Concept Guides

IV. Pattern of Organization Guides

V. Science Comprehension and Vocabulary Reinforcement Activities

At the beginning of each section is an explanation of the technique in that section.

Two textbook evaluation tools are presented in Section I on the readability of texts and the usability of texts in science courses.

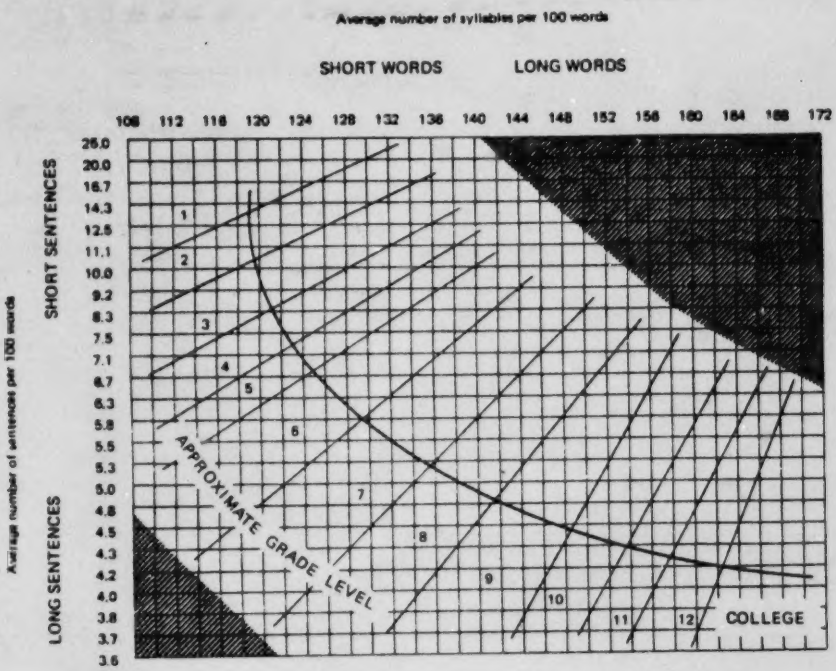
The Fry Graph, created by Edward Fry, will give the science teacher an awareness of the general readability grade level of the science text. Even more important, it will make science teachers aware of the normally wide range of reading difficulty within a particular text. The latter awareness could lead the teacher to provide more assistance for those text sections with a higher level of reading difficulty.

The Textbook Usability Checklist was taken from an Alaska Department of Education publication, *Evaluating Textbooks and Reading Materials.* The task force modified the checklist into a Science Textbook Usability Checklist. The checklist will give teachers a tool to evaluate texts before purchase, to compare sets of texts, and to plan for extra activities in those areas in which the text they must use is inadequate or totally lacking.

A blank Fry graph usability checklist and vocabulary analysis chart are provided for readers to copy and use.

GRAPH FOR ESTIMATING READABILITY

by Edward Fry, Rutgers University Reading Center, New Jersey



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I. Science Textbook Readability/Usability Checklist

*Expanded Directions for Working Readability Graph**

1. Randomly select three (3) sample passages. For each, count out exactly 100 words, beginning with the start of a sentence. *Do count proper nouns, initializations, and numerals.*

2. Count the number of sentences in the hundred words, estimating length of the fraction of the last sentence to the nearest one-tenth.

3. Count the total number of syllables in the 100-word passage. If you don't have a hand counter available, an easy way is to simply put a mark above every syllable over one in each word; then when you get to the end of the passage, count the number of marks and add 100. Small calculators can also be used as counters by pushing numeral 1, then push the + sign for each word or syllable when counting.

4. Enter graph with average sentence length and average number of syllables: plot dot where the two lines intersect. Area where dot is plotted will give you the approximate grade level.

5. If a great deal of variability is found in syllable count or sentence count, putting more samples into the average is desirable.

6. A word is defined as a group of symbols with a space on either side: thus, Joe, IRA, 1945, and & are each one word.

7. A syllable is defined as a phonetic syllable. Generally, there are as many syllables as vowel sounds. For example, *stopped* has one syllable and *wanted* has two syllables. When counting syllables for numerals and initializations count one syllable for each symbol. For example, *1945* has four syllables, *IRA* has three, and & has one.

*By Edward Fry, Rutgers University Reading Center, New Brunswick, NJ 08904.

Title *Natural World / I*

Publisher *Silver Burdett*

Fry Graph Readability *varies 6th to 10th*

Evaluator *Wallace*

Science Textbook Usability Checklist

External Organizational Aids	Has none	Poor	Adequate	Good
1. Does table of contents provide a clear overview of the contents of the textbook?			X	
2. Do chapter headings clearly define the content of the chapter?			X	
3. Do chapter subheadings clearly break out the important concept in the chapter?		X		
4. Do topic headings provide assistance in breaking the chapter into relevant parts?		X		
5. Does glossary contain all the technical terms of the textbook?	X			
6. Are graphs and charts clear and supportive of the textual material?			X	
7. Are illustrations well done and appropriate to the level of the students?				X
8. Is print size of the text appropriate to the level of student readers?				X
9. Are lines of text an appropriate length for the level of the students who will use the textbook?				X
10. Is teacher's manual available and adequate for guidance to the teacher?				X
11. Are important terms in italics or boldfaced type for easy identification by readers?			X	
12. Are textbook questions on literal, interpretive and applied levels of comprehension?				X
13. Are lab experiences integrated with text materials?				X
14. Are lab questions on literal, interpretive and applied comprehension levels?				X
Internal Usability				
1. Do questions raised and concepts presented show familiarity with ongoing research?			X	
2. Are concepts spaced appropriately throughout the text, rather than being too many in too short a space?				X
3. Is an adequate context provided to allow students to determine meanings of technical terms?			X	
4. Are the number of examples, including lab experiences, appropriate for the level of students who will be using the text?			X	
5. Is the author's style (word length, sentence length, sentence complexity, paragraph length) appropriate to the level of students who will be using the text?				X
6. Does the author use patterns of organization (compare-contrast, cause-effect, time order listing) within the writing to assist students in interpreting the text?				X

Title *Natural World / 2* Fry Graph Readability *6th–7th*

Publisher *Silver Burdett*

Evaluator *Wallace*

Science Textbook Usability Checklist

External Organizational Aids	Has none	Poor	Adequate	Good
1. Does table of contents provide a clear overview of the contents of the textbook?			X	
2. Do chapter headings clearly define the content of the chapter?		X		
3. Do chapter subheadings clearly break out the important concept in the chapter?			X	
4. Do topic headings provide assistance in breaking the chapter into relevant parts?		X		
5. Does glossary contain all the technical terms of the textbook?	X			
6. Are graphs and charts clear and supportive of the textual material?		X		
7. Are illustrations well done and appropriate to the level of the students?				X
8. Is print size of the text appropriate to the level of student readers?				X
9. Are lines of text an appropriate length for the level of the students who will use the textbook?				X
10. Is teacher's manual available and adequate for guidance to the teacher?				X
11. Are important terms in italics or boldfaced type for easy identification by readers?			X	
12. Are textbook questions on literal, interpretive and applied levels of comprehension?				X
13. Are lab experiences integrated with text materials?				X
14. Are lab questions on literal, interpretive and applied comprehension levels?				X
Internal Usability				
1. Do questions raised and concepts presented show familiarity with ongoing research?			X	
2. Are concepts spaced appropriately throughout the text, rather than being too many in too short a space?				X
3. Is an adequate context provided to allow students to determine meanings of technical terms?			X	
4. Are the number of examples, including lab experiences, appropriate for the level of students who will be using the text?			X	
5. Is the author's style (word length, sentence length, sentence complexity, paragraph length) appropriate to the level of students who will be using the text?				X
6. Does the author use patterns of organization (compare-contrast, cause-effect, time order listing) within the writing to assist students in interpreting the text?				X

Title *BSCS Green Version*

Publisher *Rand McNally*

Fry Graph Readability *mid 10th; fair amount of variability 7–12th*

Evaluator *Rod Brown*

Science Textbook Usability Checklist

External Organizational Aids	Has none	Poor	Adequate	Good
1. Does table of contents provide a clear overview of the contents of the textbook?				X
2. Do chapter headings clearly define the content of the chapter?				X
3. Do chapter subheadings clearly break out the important concept in the chapter?				X
4. Do topic headings provide assistance in breaking the chapter into relevant parts?				X
5. Does glossary contain all the technical terms of the textbook?	X			
6. Are graphs and charts clear and supportive of the textual material?				X
7. Are illustrations well done and appropriate to the level of the students?			X	
8. Is print size of the text appropriate to the level of student readers?				X
9. Are lines of text an appropriate length for the level of the students who will use the textbook?				X
10. Is teacher's manual available and adequate for guidance to the teacher?				X
11. Are important terms in italics or boldfaced type for easy identification by readers?				X
12. Are textbook questions on literal, interpretive and applied levels of comprehension?				X
13. Are lab experiences integrated with text materials?				X
14. Are lab questions on literal, interpretive and applied comprehension levels?				X
Internal Usability				
1. Do questions raised and concepts presented show familiarity with ongoing research?				X
2. Are concepts spaced appropriately throughout the text, rather than being too many in too short a space?			X	
3. Is an adequate context provided to allow students to determine meanings of technical terms?		X ←	→ X	
4. Are the number of examples, including lab experiences, appropriate for the level of students who will be using the text?				X
5. Is the author's style (word length, sentence length, sentence complexity, paragraph length) appropriate to the level of students who will be using the text?		X ←	→ X	
6. Does the author use patterns of organization (compare-contrast, cause-effect, time order listing) within the writing to assist students in interpreting the text?			X ←	→ X

Title *Biological Science: An Inquiry into Life (BSCS)*

Publisher *Harcourt, Brace, Jovanovich*

Fry Graph Readability *11 to 13*

Evaluator *C. M. Chmielowski*

Science Textbook Usability Checklist

External Organizational Aids	Has none	Poor	Adequate	Good
1. Does table of contents provide a clear overview of the contents of the textbook?				X
2. Do chapter headings clearly define the content of the chapter?				X
3. Do chapter subheadings clearly break out the important concept in the chapter?			X	
4. Do topic headings provide assistance in breaking the chapter into relevant parts?				X
5. Does glossary contain all the technical terms of the textbook?	X			
6. Are graphs and charts clear and supportive of the textual material?				X
7. Are illustrations well done and appropriate to the level of the students?				X
8. Is print size of the text appropriate to the level of student readers?			X	
9. Are lines of text an appropriate length for the level of the students who will use the textbook?			X	
10. Is teacher's manual available and adequate for guidance to the teacher?				X
11. Are important terms in italics or boldfaced type for easy identification by readers?				X
12. Are textbook questions on literal, interpretive and applied levels of comprehension?				X
13. Are lab experiences integrated with text materials?				X
14. Are lab questions on literal, interpretive and applied comprehension levels?				X
Internal Usability				
1. Do questions raised and concepts presented show familiarity with ongoing research?				X
2. Are concepts spaced appropriately throughout the text, rather than being too many in too short a space?				X
3. Is an adequate context provided to allow students to determine meanings of technical terms?			X	
4. Are the number of examples, including lab experiences, appropriate for the level of students who will be using the text?				X
5. Is the author's style (word length, sentence length, sentence complexity, paragraph length) appropriate to the level of students who will be using the text?		X		
6. Does the author use patterns of organization (compare-contrast, cause-effect, time order listing) within the writing to assist students in interpreting the text?				X

Title *Investigating the Earth* Fry Graph Readability *7th–10th*

Publisher *Houghton Mifflin*

Evaluator *Wallace*

Science Textbook Usability Checklist

External Organizational Aids	Has none	Poor	Adequate	Good
1. Does table of contents provide a clear overview of the contents of the textbook?				X
2. Do chapter headings clearly define the content of the chapter?				X
3. Do chapter subheadings clearly break out the important concept in the chapter?			X	
4. Do topic headings provide assistance in breaking the chapter into relevant parts?			X	
5. Does glossary contain all the technical terms of the textbook?	X			
6. Are graphs and charts clear and supportive of the textual material?			X	
7. Are illustrations well done and appropriate to the level of the students?			X	
8. Is print size of the text appropriate to the level of student readers?			X	
9. Are lines of text an appropriate length for the level of the students who will use the textbook?			X	
10. Is teacher's manual available and adequate for guidance to the teacher?				
11. Are important terms in italics or boldfaced type for easy identification by readers?		X		
12. Are textbook questions on literal, interpretive and applied levels of comprehension?				X
13. Are lab experiences integrated with text materials?			X	
14. Are lab questions on literal, interpretive and applied comprehension levels?				X
Internal Usability				
1. Do questions raised and concepts presented show familiarity with ongoing research?			X	
2. Are concepts spaced appropriately throughout the text, rather than being too many in too short a space?		X		
3. Is an adequate context provided to allow students to determine meanings of technical terms?		X		
4. Are the number of examples, including lab experiences, appropriate for the level of students who will be using the text?		X		
5. Is the author's style (word length, sentence length, sentence complexity, paragraph length) appropriate to the level of students who will be using the text?		X		
6. Does the author use patterns of organization (compare-contrast, cause-effect, time order listing) within the writing to assist students in interpreting the text?			X	

II. How to Use the Simplified Technical Vocabulary Analysis Chart from Richard Cunningham's

The Language of Content: How to Introduce, Develop, and Reinforce It.

1. The teacher reads the assigned unit and circles technical terms needed to understand the assignment.

2. The teacher ranks words by assigning each to major categories:
   (a) "Review terms" have been studied in previous lessons.
   (b) "Key concept" terms are essential to understand.
   (c) "Relative value" words are important but not key concepts.
   (d) "Interesting" words might be taught time permitting.

3. The teacher decides what amount of help in interpreting the terms has been provided by the author:
   (a) "Direct help" words are defined by author as they first appear.
   (b) "Indirect help" words are given meaning through context clues or glossary.
   (c) "No help" words are given to students with no help provided by the author for putting meaning into them.

4. The teacher asks him/herself "If I didn't know the meaning of the word, how might I figure it out?" The answer makes the decision as to which of the three last columns to put the word in:
   (a) Context clues.
   (b) Word structure.
   (c) Dictionary strategies.

5. The teacher focuses on the largest and/or most important group of words to teach important words and vocabulary skill simultaneously. Obviously the words that are key concept words with no help given would take the precedence over the words that form other joint categories.

   Through use of the Simplified Technical Vocabulary Analysis Chart, the science teacher can plan for teaching technical vocabulary and vocabulary skills at the same time.

SIMPLIFIED TECHNICAL VOCABULARY ANALYSIS CHART

Reading Selection *Natural World / I* by: *Silver Burdett* page(s) *171-183–ch. 9*

Course _____ Grade *7* Teacher *Wallace*

Concept *There are many forms of energy.*

	VOCABULARY TYPE				AUTHOR HELP			APPLICABLE SKILL		
Technical Term	Review Technical Vocabulary	Key Concept	Relative Value	Interesting	No Help	Indirect Help	Direct Help	Context	Structure	Dictionary/ Glossary
gravitational		X				X		X		
potential energy		X					X	X		
kinetic energy		X					X	X		
electrical energy		X					X	X		
battery			X			X		X		
radiometer			X			X		X		
light energy		X					X	X		
temperature			X			X		X		
palm glass			X			X		X		
heat energy		X				X		X		
solution			X			X		X		
mechanical energy		X				X		X		
charging			X				X	X		
chemical energy		X					X	X		

SIMPLIFIED TECHNICAL VOCABULARY ANALYSIS CHART

Reading Selection *Natural World / I* by: *Silver Burdett* page(s) *19-47–ch. 2 & 3*

Course _____ Grade *7* Teacher *Wallace*

Concept *Force is measured by various changes.*

	VOCABULARY TYPE				AUTHOR HELP			APPLICABLE SKILL		
Technical Term	Review Technical Vocabulary	Key Concept	Relative Value	Interesting	No Help	Indirect Help	Direct Help	Context	Structure	Dictionary/ Glossary
influence		X				X		X		
force		X					X	X		
motion			X			X		X		
operational definition		X					X	X		
attach				X	X					X
technique			X			X		X		
equally spaced			X			X		X		
standard		X					X	X		
scales			X			X		X		
distance		X				X		X		
weight			X				X	X		
graph			X			X		X		
meter						X		X		
Newton		X					X	X		
force measurer			X			X		X		

SIMPLIFIED TECHNICAL VOCABULARY ANALYSIS CHART

Reading Selection *Natural World / 2 by: Silver Burdett* page(s) *ch. 2-3, Excursion 3-1*

Course _____ Grade *8* Teacher *J. Wallace*

Concept *All matter is made up of particles.*

	VOCABULARY TYPE				AUTHOR HELP			APPLICABLE SKILL		
Technical Term	Review Technical Vocabulary	Key Concept	Relative Value	Interesting	No Help	Indirect Help	Direct Help	Context	Structure	Dictionary/ Glossary
solids		X				X		X		
liquids		X				X		X		
gas		X						X		
bubbles			X					X		
hydrochloric acid			X				X	X		
beakers			X			X		X		
dropper bottles			X			X		X		
matter		X						X		
particle model		X					X	X		
mass		X					X	X		
balance			X			X		X		
weight		X			X					X

SIMPLIFIED TECHNICAL VOCABULARY ANALYSIS CHART

Reading Selection *BSCS Green Version (4th ed.)* page(s) *75–85*

Course *Biology I* Grade *10* Teacher *Rod Brown*

Concept *a community*

	VOCABULARY TYPE				AUTHOR HELP			APPLICABLE SKILL		
Technical Term	Review Technical Vocabulary	Key Concept	Relative Value	Interesting	No Help	Indirect Help	Direct Help	Context	Structure	Dictionary/ Glossary
population	X	X								
interact	X	X								
web (food web)	X	X								
relationship		X					X	X		
community		X					X	X	X	
organism	X		X							
herbivore (herbiv.)	X			X						
carnivore (carniv.)	X			X						
aquatic			X			X			X	X
terrestrial			X			X			X	X
mortality	X		X							
decomposer	X		X							
vegetation	X			X						
algae			X		X			X		X
abundant			X					X		X
producer	X		X							
predator (predator/prey)		X					X	X		

SIMPLIFIED TECHNICAL VOCABULARY ANALYSIS CHART

continued: (2)

Reading Selection *BSCS Green Version (4th ed.)* page(s) _____

Course _____ Grade ____ Teacher _____

Concept _____

	VOCABULARY TYPE				AUTHOR HELP			APPLICABLE SKILL		
Technical Term	Review Technical Vocabulary	Key Concept	Relative Value	Interesting	No Help	Indirect Help	Direct Help	Context	Structure	Dictionary/ Glossary
parasitism (parasite/host)		X					X	X		
microorganism			X		X				X	
commensalism		X					X	X		
mutualism		X					X	X		
competition		X					X	X		

SIMPLIFIED TECHNICAL VOCABULARY
ANALYSIS CHART

Reading Selection *Biological Science: An Inquiry into Life (BSCS) by: Harcourt, Brace, Jovanovich* page(s) *240–245*

Course *Biology* Grade *9-10* Teacher *C.M. Chmielowski*

Concept _____

	VOCABULARY TYPE				AUTHOR HELP			APPLICABLE SKILL		
Technical Term	Review Technical Vocabulary	Key Concept	Relative Value	Interesting	No Help	Indirect Help	Direct Help	Context	Structure	Dictionary/ Glossary
microorganism				X		X				X
cell		X				X				X
oxygen		X			X					X
species				X	X					X
bacteria				X	X					X
glucose			X			X				X
A T P			X			X				X
reactions			X			X				X
carbon dioxide		X			X					X
metabolism			X			X			X	
waste product		X				X		X		
respiring (cell)		X			X					X
respiration		X					X	X		
breathing		X					X	X		
paramecium				X		X				X
diffuse		X				X			X	
cell membrane			X			X				X

SIMPLIFIED TECHNICAL VOCABULARY ANALYSIS CHART

continued: (2)

Reading Selection *Biological Science: An Inquiry into Life (BSCS)* page(s) _____

Course _____ Grade ____ Teacher *C.M. Chmielowski*

Concept _____

	VOCABULARY TYPE				AUTHOR HELP			APPLICABLE SKILL		
Technical Term	Review Technical Vocabulary	Key Concept	Relative Value	Interesting	No Help	Indirect Help	Direct Help	Context	Structure	Dictionary/ Glossary
cytoplasm			X			X				X
mitochondria			X			X				X
organic molecules				X		X				X
hydrogen				X	X					X
photosynthesis				X		X				X
transport system			X			X		X	X	
tissue				X		X				X
trachea				X			X	X		
pharynx				X			X	X		
larynx				X			X	X		
bronchi				X			X	X		
lungs		X				X		X		
epiglottis				X			X	X	X	
nervous regulation			X		X			X		
diaphragm		X					X	X		
inhalation		X					X	X		
exhalation		X					X	X		

SIMPLIFIED TECHNICAL VOCABULARY
ANALYSIS CHART

continued: (3)

Reading Selection *Biological Science: An Inquiry into Life (BSCS)* page(s) _____

Course _____ Grade ____ Teacher *C.M.Chmielowski*

Concept _____

	VOCABULARY TYPE				AUTHOR HELP			APPLICABLE SKILL		
Technical Term	Review Technical Vocabulary	Key Concept	Relative Value	Interesting	No Help	Indirect Help	Direct Help	Context	Structure	Dictionary/ Glossary
capillaries		X				X		X		
rib cage		X				X		X		

III. Concept Guides

Construction and Use of Concept Guides

by Richard Barron and Robert Baker

Students are asked to read for many purposes in content subjects. However, one of the most common purposes for reading involves the acquisition and storage of information. In this set of circumstances, the reading process may be viewed as a two-step procedure. The student acquires informational 'bits' (lower-order concepts), which he/she then categorizes under more inclusive higher-order concepts. Thus, to construct and use a concept guide:

1. Analyze the reading passage to determine the major concepts that you wish the students to acquire. List them in a word or, at most, a phrase. These words and phrases will comprise Part II of the guide.

2. Reread the passage and judiciously select statements which underlie the major concepts. These statements plus distractors will comprise Part I of the guide.

3. Have students respond to the guide by:

   a. Indicating whether the statements in Part I actually occurred in the passage.

   b. Categorizing the statements from Part I under the concept(s) to which they most nearly relate in Part II.*

4. Provide students with feedback. This may be accomplished in teacher-led discussions with the entire class and/or in student-directed small group discussions.

*You may wish to have these "major" concepts categorized under even more inclusive terms.

Dr. Judie Thelen
Frostburg State College (MD)

Text: Natural World/I by: J. Wallace
Silver Burdett – Chapters 2 & 3

Concept: Force is measured by various changes.

I. Put an "F" in front of each example that shows a force has occurred. Be ready to defend your reasoning.

_____ 1. A Sealand truck stops at a red light.
_____ 2. Your little sister stuffs "silly putty" in a keyhole.
_____ 3. A swimmer swims 20 laps.
_____ 4. A magnet pulls a paperclip.
_____ 5. A state trooper rushes to an accident.
_____ 6. A force measurer blade moves to 4 newtons.
_____ 7. You ride your bicycle to school.
_____ 8. Mr. Large bench presses 120 kg.
_____ 9. A salmon migrates up the Kenai River.
_____ 10. A kilogram mass weighs 5 newtons.

II. Below are four headings that show the types of changes force can have. Put the number of each statement under the type of change that it shows. Number 1 is done for you.

Shape	Motion	Speed	Direction
	1		

Text: Biological Science: by: C.M. Chmielowski
An Inquiry into Life (BSCS) pp. 240-244
Harcourt, Brace, Jovanovich

Concept Guide

I. Put a check in front of each statement which is a paraphrase or quote of what the author says on pages 240-244. Pages and paragraph numbers are given to guide you. Discuss each choice with your group.

___1. Frogs have moist skin which oxygen and carbon dioxide can pass through easily. (page 241, paragraphs 2-3)

___2. The source of oxygen supply for animals is green plants. (page 241, paragraph 1)

___3. The lungs are a pair of closed sacs connected to the outside by the trachea. (page 242, paragraph 1)

___4. Capillaries surround each air sac of the lungs. (page 242, figure 12-1)

___5. The diaphragm is the dome or roof of the top of the chest cavity. Therefore, the volume of the chest cavity increases when the diaphragm relaxes. (page 244, paragraph 7)

___6. The reason that most living cells need oxygen is to use the energy of glucose to make ATP. (page 240, paragraph 1)

___7. Blood picks up carbon dioxide while flowing through the capillaries of the tissue in the body. (page 243, paragraph 1)

___8. Oxygen for your body is picked up by blood flowing through capillaries around the air sacs that make up the lungs. (page 242, paragraph 2)

___9. The epiglottis directs food into the trachea. (page 244, paragraph 2)

___10. We inhale when the chest wall of ribs, muscles, and skin moves up and out. (page 244, paragraph 6)

II. Below are two terms. Look at the numbered statements above. Put the number of the statements under the word it refers to. If it refers to both words, put the number under both words. If it doesn't refer to either term, don't put the number down. Discuss your decisions with the group.

Breathing	*Respiration*

IV. Pattern of Organization Guides

One of the most common patterns of organization is *comparison and contrast*. In this pattern the author shows how ideas and topics relate to each other by being compared (shown to be alike) or contrasted (shown to be different).

Another pattern into which expository materials are organized is *cause and effect*. Through this pattern the author presents ideas or topics as being a cause of something or by being an effect of something.

Many materials use a chronological pattern or sequence. In this pattern the author focuses on when ideas or events occur in relation to each other. The simplest form of chronological sequence relates what happened first and what events followed in time order.

Some selections use a simple listing pattern which is equivalent to presenting items as though they are tossed into a grocery bag. They are listed as they fall out of the bag with little or no semantic structure underlying their order of occurrence. Dictionaries and encyclopedias with their alphabetic order use this pattern.

The teacher who assigns a reading selection using any of the patterns of organization explains organizational patterns and how to recognize them before students read the selection. The students will be more successful in interpreting the selection if this step is not left out.

One way to recognize the predominant pattern of organization in expository writing is by analyzing the connectives used by the author. Connectives are signal words which can signal or cue student to patterns the author uses to communicate his ideas.

Connectives as Pattern Signals

Compare and Contrast		Cause and Effect	Time	Listing
likewise	otherwise	thus	finally	first
similarly	in spite of	therefore	while	second
many	although	consequently	when	third
	conversely	accordingly	soon	next
	however	hence	at the same time	in addition
	less	as a result	next	also
	though	because	first	
	yet	since	second	
	on the contrary	so that		
	nevertheless			
	notwithstanding			
	on the other hand			

Construction and Use of Patterns-of-Organization Guides

Students read in many ways in content subjects. However, one of the most common reading requirements involves interpreting information in texts. In this situation the reading process may be viewed as an interpretive process. The student acquires informational "bits" which have been organized to form more inclusive higher-order concepts. Thus, to construct and use a Pattern of Organization Guide:

1. Analyze the reading passage to determine the major concepts that you wish the students to acquire.

2. Analyze the reading passage to determine the predominant pattern of organization the author uses to support the major concepts. For explanation of four major patterns see page 25.

3. Reread the passage and select statements or phrase statements which support the major concepts through a predominant pattern of organization within the passage. These statements plus distractors will comprise the pattern of organization guide.

4. Have students respond to the guide by:

    a. indicating whether the statements that reflect on organizational pattern actually occurred in the passage.

    b. identifying the major concept supported by the statement.

5. Provide students with feedback through teacher-led, whole-class discussions and/or student-directed, small-group discussions.

BSCS Green Version 2nd ed.

PATTERNS OF ORGANIZATION GUIDE – INTRODUCTION

BIOLOGY I – MR. BROWN Name _____

INTRODUCTION. When you read a textbook or look at an experiment, it often seems to be nothing but a huge mass of unrelated facts and directions. However, as we look at written material, we find that it is often written in a way that will help you understand this material. The material is often arranged so that connections are made between the facts. These connections will help you understand the material and assist you as you learn it. However, in order to use these "organizational patterns" it is necessary to learn to recognize them. In this exercise we will look at some of these patterns in an experiment that you have recently completed.

Your material may be arranged in many ways. Four of the main "organizational patterns" are called: **Listing, Sequence, Cause/Effect,** and **Compare/Contrast.**

When we *list* materials, we are just making a list. For example, the list of materials given for each experiment is simply an easy way of telling you what equipment you will need for this experiment. This list does not need to be given in any special order.

When we talk about *sequence,* we are talking about a list of information that is given in a certain order. For example, the "procedure" of your experimental write-up is a sequence. These steps must be done in a certain order.

When we talk about *cause/effect,* we are saying that one thing caused another thing to happen. For example, if we turn off the refrigeration unit on the saltwater aquarium, the fish will die because the temperature rises. The cause would be the turning off of the refrigeration unit. The effect would be higher water temperatures and dead fish.

When we talk about *compare/contrast* we are showing how two pieces of information are alike *and* different. For example, in the second part of our seed experiment, we compared the germination rates of different types of

seeds. This showed us that several types of seeds germinated at nearly the same speed. In contrast, we found that other types of seeds germinated faster or slower. That is, their germination was different than the germination of the original seeds.

In the following exercise we will be examining Investigation 1.2 – The Germination of Seeds. We will see how each of the above organizational patterns are used in this experiment.

I. *Listing and Sequence:* In the following list, put an "L" in front of the statements that refer to lists; put an "S" in front of the statements that refer to sequences (lists that must be in a certain order); put an "X" in front of the statements that refer to neither of these.

_____ Materials section of the experiment

_____ Procedure section of the experiment

_____ Title of the experiment

_____ The two hypotheses

_____ The data table that you filled out

_____ The purpose section of the experiment

_____ The types of seeds used in the experiment

_____ The form of the experiment: title, purpose, hypothesis, materials, procedure, data, and conclusions

_____ The number of experiments (1.2)

II. *Cause/effect:* Match the cause with the effect.

_____ 1. Soaking the seeds in the fungicide for 15 minutes.

_____ 2. The seeds were soaked in water.

_____ 3. Mr. Brown told you to do it.

_____ 4. Plastic bags were put around the petri dishes full of seeds.

A. The seeds grew faster.

B. Mold did not grow on the sprouting seeds (it wasn't supposed to, anyway).

C. The petri dishes of seeds did not dry out while we counted the sprouts for a week.

D. You drew a data chart in your notebook.

III. *Compare/contrast:* Put a "+" by the statements that indicate comparisons. Put a "–" by the statements that indicate contrasts. Put a "0" by the statements that indicate neither comparisons nor contrasts.

_____ The corn and pea seeds both sprouted quickly.

_____ The corn seeds sprouted quickly; the lima bean seeds sprouted slowly.

_____ The vetch seeds that were soaked 24 hours sprouted faster than the vetch seeds that were not soaked.

_____ We used five petri dishes in the experiment.

_____ This experiment is very similar to one that we did in the 7th grade.

IV. *All of them:* Do as directed by each question. Tell whether each of the questions deals with listing, sequence, compare/contrast, or cause/effect. (You must be able to tell why you put the question into the category.)

1. Why did the different groups each use a different type of seed?

2. Arrange the following steps of the procedure in the correct order:

   A. Soak the seeds in water.

   B. Soak the seeds in fungicide.

   C. Gather your materials.

   D. "Plant" your seeds.

   E. Observe your seeds.

3. What types of seeds were used in the experiment?

4 Which type of seeds sprouted most quickly? Which type sprouted most slowly?

5. List the following types of seeds in their order of sprouting (from fast to slow): corn, lima bean, lettuce, pea

Text: Natural World/I
Silver Burdett – Chapter 9

by: J. Wallace

Concept: There are many forms of energy.

Pattern-of-Organization Guide
(Cause/Effect)

I. Check the items below if the first word or term causes the second to happen. The numbers in parentheses are the pages and paragraphs where you can find information to help you.

_____ 1. Shortage/Energy crisis (page 171, paragraphs 1-3)

_____ 2. Charged battery/Sinkers lifted (page 172, paragraphs 1-2)

_____ 3. Uncharged battery/Bulb lighted (page 173, last 3 paragraphs)

_____ 4. Sunlight/Radiometer moves (page 174)

_____ 5. Charged battery/Hot nichrome wire (page 175)

_____ 6. Battery/Liquid in palm glass moves (page 176)

_____ 7. Battery charger/Copper forms on carbon rod (page 177)

_____ 8. Chemical energy/Electrical energy (page 179)

II. Look at Table 9-1 on page 183. Answer the following questions:

1. When you are charging the battery, what is the effect of the charger (energy supplier)? _____

_____

2. Why can stored electricity also be called chemical potential?

_____

3. In the bottom line, what is the cause? _____

The effect? _____

The energy changes involved? _____

_____

Text: Biological Science: An Inquiry into Life (BSCS) pp. 240-245
Harcourt, Brace, Jovanovich

by: C.M. Chmielowski

Pattern-of-Organization Guide
(Time Order)

I. Number in sequence the following steps in respiration in the paramecium. (Page 240, paragraph 4)

_____ 1. Carbon dioxide molecules move to the cell membrane by diffusion and by the cytoplasm moving.

_____ 2. The mitochondria receives oxygen by diffusion and by the cyctoplasm moving.

_____ 3. Energy is transferred from organic molecules inside the mitochondria.

_____ 4. Carbon dioxide molecules diffuse across the cell membrane into the cytoplasm.

_____ 5. Oxygen in the pond diffuses through the cell membrane into the cytoplasm.

II. Number in sequence the following steps in human breathing. (Page 243, paragraph 2 to page 244, paragraph 4)

_____ 1. The epiglottis is up high when a person breathes to let a lot of air enter the lungs.

_____ 2. Air comes into the body through the mouth or nostrils.

_____ 3. Inside the nasal cavity, dirt is filtered out of the air, the air is moistened, and the temperature of the air becomes closer to body temperature.

_____ 4. Air goes down to bronchi, each leading to one lung.

_____ 5. On the way to the lungs, air goes through the larynx.

_____ 6. Air then passes through the trachea.

Pattern-of-Organization
(Cause and Effect)

III. A slanted line separates two phrases in each numbered statement below. Put a check on the line if the first phrase is the cause and the second phrase is the effect. Discuss your answers with your group.

_____ 1. The diaphragm contracts/the daiphragm becomes somewhat flatter. (page 244, paragraph 7)

_____ 2. The chest cavity increases in volume/there is less internal pressure inside the chest cavity. (page 244, paragraph 8)

_____ 3. Pressure inside the chest cavity decreases/air is forced outward from the lungs. (page 244, paragraph 8)

_____ 4. The diaphragm contracts/becomes dome-shaped. (page 245, paragraph 1)

_____ 5. Pressure on the lungs is increased/air is squeezed out through the nose to the external atmosphere. (page 245, paragraph 1)

_____ 6. The chest wall moves up and out/the volume of the chest cavity increases. (page 244, paragraph 6)

_____ 7. The diaphragm flattens/the volume of the chest cavity increases. (page 244, paragraph 8)

_____ 8. The chest wall moves upward and outward/the volume of the chest cavity increases. (page 244, paragraph 8)

V. Science Comprehension and Vocabulary Reinforcement Activities

Reinforcement activities in this section are in two general categories: comprehension reinforcement and vocabulary reinforcement.

The comprehension reinforcement activities give students practice in reading at the literal, interpretive and applied levels, at the same time strengthening the students' grasp of the science materials.

The vocabulary reinforcement activities allow students to interact with important technical terms of the course content. A student who doesn't receive this kind of reinforcement will only remember the science terms and concepts long enough to pass a test on them.

The comprehension activities are created by the science teacher's directions to the students on how to read the same unit and what to do with each part of the reading.

The vocabulary activities are created by the science teacher's analysis of the key terms in the unit and providing a format for student interaction with the terms. The formats provided in this section for vocabulary reinforcement are matching exercises, unscrambling exercises, and categorization exercises.

Text: Natural World/2 by: J. Wallace
Silver Burdett – Chapter 2 & 3; Excursion 3-1.

I. Put a check beside each statement that you found to be true from your experiments in chapters 2 and 3 and from reading Excursion 3-1.

_____ 1. Bubbles have mass.

_____ 2. Mass is the amount of space an object takes up.

_____ 3. Gas has mass.

_____ 4. A balance measures mass.

_____ 5. Anything that has mass is made of particles.

_____ 6. Mass changes if an object is taken to the moon.

_____ 7. Rocks have mass.

_____ 8. Mass is the amount of space an object takes up.

_____ 9. Objects on the moon have less weight because the moon has less mass.

_____ 10. HCL has mass.

II. Check the statements below that your experiments, so far, have shown to be true.

_____ 1. Matter exists in three forms: solid, liquid, gas.

_____ 2. Mass of an object remains the same wherever it is located.

_____ 3. The weight of an object depends on where it is.

_____ 4. Carbon dioxide is a gas produced from HCL and shell.

_____ 5. All matter is made up of particles.

Text: BSCS Green Version (4th ed.) by: R. Brown

Refer to pages in text:

pp. 20-21 ("Energy Pathways")

pp. 22 (Diagram 1-23), and

pp. 75-83 ("Communities")

Refer to Lab: Muskeg Pond Lab

Concept: Transfer of matter and energy within a pond community

Procedure: Follow the directions given for each section.

A. Put a "P" before each organism that is a producer. Put a "C" before each organism that is a consumer. Put an "A" before each organism that is a decomposer.

_____ 1. Fly, midge, and mosquito larvae

_____ 2. Amoebas (Arcella, Difflugia, Centropyxis)

_____ 3. Ciliated protozoans (paramecium, hypotrichs, vorticella)

_____ 4. Algae (diatoms, desmids)

_____ 5. Bacteria

_____ 6. Water fleas (Daphnia)

_____ 7. Dragonfly nymphs

B. Match the organisms below with the food materials that they eat. An organism may eat more than one type of food material. Be sure to put down all the food materials an organism eats.

_____	1. Midge larva	A.	Doesn't eat; carries on photosynthesis
_____	2. Daphnia	B.	Organic detritus
_____	3. Arcella	C.	Daphnia
_____	4. Paramecium	D.	Midge larva
_____	5. Diatom	E.	Bacteria
_____	6. Bacteria	F.	Protozoans
_____	7. Desmid	G.	Diatoms
_____	8. Dragonfly nymph	H.	Desmids

C. Put an "F" in the blank if the statement is false. Put a "T" in the blank if the statement is true. Put an "X" in the blank if you do not know whether it is true or false.

_____ 1. A food web shows what eats what in a community.

_____ 2. A food web shows the paths by which energy and materials are passed throughout the community.

_____ 3. Energy from the sun is captured by plants using photosynthesis.

_____ 4. Scientists have recently discovered that photosynthesis bacteria are important producers in fresh and salt waters.

_____ 5. Diatoms and desmids are the main producers in ponds.

_____ 6. Fly and midge larvae are important pond producers.

____ 7. Water fleas are filter feeders.

____ 8. Water fleas eat dragonfly nymphs.

____ 9. Water fleas eat bacteria, small diatoms, and organic detritus.

____ 10. Dragonfly nymphs are first-order consumers.

D. Put an "E" before the statements that refer to the transfer of energy in a pond community. Put an "M" before the statements that refer to the transfer of matter. Put an "X" before the statements that refer to neither energy nor matter transfer. (Some of the statements below will refer to *both* the transfer of energy and the transfer of matter.)

____ 1. A consumer builds its body by using matter from the organisms that it eats.

____ 2. Each organism in the food chain "uses" some of the energy that has been captured by the sun. This "used" energy is given off from the body as heat.

____ 3. Most of the water fleas in a pond during the summer are female.

____ 4. An organism uses energy to move, breathe, keep its heart beating, etc.

____ 5. The sun supplies the energy for the living world.

____ 6. A producer builds its body by using water from the pond and from the atmosphere that is dissolved in the pond.

____ 7. The sun's energy that the producers trap is stored in the bonds of food molecules that they manufacture.

E. Draw a labelled diagram that illustrates how energy is transferred from the sun to the dragonfly nymph as a second-order consumer.

BIOLOGY I – MR. BROWN
STUDY GUIDE: THE WEB OF LIFE (Chapter 1)
BSCS GREEN VERSION – 2nd Edition

INTRODUCTION. The first three chapters in your book talk about the ways in which the living plants and animals in an area depend on one another. They also talk about the ways in which the non-living *(abiotic)* parts of the environment affect the living plants and animals. Organisms are studied both as individuals and as members of groups.

PROCEDURE. Follow the directions given in each question below.

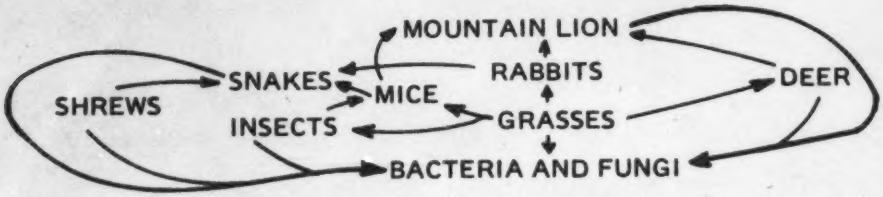
1. Find the word *abiotic* in the introduction above. What does this word mean? Find the word *environment* in the introduction above. What does this word mean? Find the word *organism* in the introduction above and on page 4, paragraph 3 of your text. (Hint: it is in italics.) What does this word mean?

2. Read page 3, paragraphs 3 and 4, and page 4, paragraph 1. Look at figure 1-2, page 3. List the producers and consumers that you see in the picture.

3. Read the definition of *food* given in italics on page 28. How would a biologist define the term *food*? List some materials that are foods for you. List some materials that are food for a moose, but not food for you. (Hint: if you don't know what a moose eats, check the leaflet on moose in the ADF&G "Wildlife Notebook" series in the room.) List some materials that are *not* food for any organism.

4. Read the section "Food Webs" on page 29 and page 30, paragraph 1.

5. Refer to the diagram below and answer the questions.



A. This diagram illustrates a _____

B. The producers shown here are _____

C. List the first-order consumers shown here _____

D. List the second-order consumers shown here _____

E. List the third-order consumers shown here _____

F. Which organisms can be both second- and third-order consumers?
_____

G. Which organisms are herbivores? _____

H. Which organisms are carnivores? _____

I. Which organisms are omnivores? _____

J. Read page 21, paragraph 4. Bacteria and fungi are special types of consumers called _____. Why are they considered to be special types of consumers? _____
_____
On what page do we find a picture of a decomposer (saprovore)? ____

K. Draw one food chain that is illustrated in the food web above.

6. Read the section on *energy* on pages 18, 19, and 20 (do not read the last paragraph on page 20).

7. What is the source of energy for the living world?

8. What is the process called that plants use to capture the energy of the sun?

9. How is this captured energy stored in the plants? What materials does the plant take from the soil and the atmosphere that are used to store this energy?

10. Plants may be called "transformers of energy" because:

    (Hint: look up the word "transform" in the dictionary if you don't know what it means.)

    A. They are green.
    B. They take water from the soil and carbon dioxide from the atmosphere.
    C. They change radiant energy to chemical energy.
    D. They are not consumers.

11. Read page 21, paragraph 2. How are producers different than consumers?

12. Read the last paragraph on page 21 and the first paragraph on page 22. Look at Figure 1-12 on page 22. Which of the following statements are true? (More than one of them may be true.)

    A. In any area, the total weight of the producers is greater than the total weight of any group of consumers.
    B. All organisms use energy to live, so less energy is passed on to each following level in the food chain.
    C. Organisms use energy to keep warm, run, catch food, and breathe.
    D. If a moose eats one pound of willow branches, he will gain one pound of weight.

13. Why does the energy pyramid have the shape of a pyramid?

14. People living in overcrowded countries eat a lot of starchy type food such as rice and potatoes and very little meat. Why don't they eat much meat?

15. Look at fig. 1-3, page 23. What are the five most common elements found in the bodies of organisms?

16. Read the "Matter" section on pages 22 and 23 (first paragraph only). Look at figs. 1-14, 1-15, and 1-16 (pages 24, 25, 26). The water, calcium, and carbon cycles illustrate: (More than one may be correct.)

    A. the fact that elements are used over and over again.
    B. the fact that elements are used only once.
    C. the fact that living organisms die and are broken down by saprovores so that their materials can be used again.
    D. the fact that it often snows in the mountains.

17. What is the source of the elements that make up the body of an organism?

18. *Organic* materials are materials that are found in living organisms or in organisms that were once living, or they are materials that have carbon in them. *Inorganic* materials are materials that do not have carbon in them and were never alive. Tell whether the following materials are organic or inorganic:

dead plants _____

rocks _____

coal _____

t-bone steak _____

aluminum roofing _____

board _____

19. Read the section "The Biosphere" on page 31. What does the term biosphere mean?

20. Read the section "Man and the Biosphere" on pages 32-33. List some animals that can change their environment.

21. The following sentences represent the main ideas from this chapter. Fill in the blank spaces to complete the statements.

    A. The biosphere can be called a system because its parts "work" together and _____ on each other. The parts of the biosphere are the living _____ and the non-living factors, such as weather, soil, and rocks.

    B. Both individuals and groups of organisms tend to maintain a steady state in spite of environmental_____.

    C. Energy flows from the _____ through the living system and finally away from the Earth in the form of _____ . This energy is passed from organism to organism in _____ _____ form.

    D. The material (matter) in living things is the same material that is in _____ things.

    E. Matter is used again and again by living things. _____ is used only once.

    F. Earth's living system, together with its _____ environment, is called the _____.

    G. Man is an important organism in the biosphere because he has the power to _____ it.

Text: Natural World / I by: J. Wallace
Silver Burdett – Chapter 2 – Vocabulary

I. Listen to the words on the Language Master.

II. Match the words with their meanings; write the number of the correct meaning next to the word.

_____ influence

_____ force

_____ motion

_____ operational definition

_____ attach

_____ technique

_____ equally spaced

_____ standard

1. distance between is the same
2. energy on an object
3. to cause to move
4. something set up as a rule to measure with
5. to learn a way to do something
6. fasten
7. to cause to do something
8. how you can tell if something is present

III. Use the vocabulary words to fill in these blanks.

1. The battery _____ the motor.

2. The meter is a _____ that we use to measure length.

3. Push and pull are two types of _____.

4. If lines are one centimeter apart they are _____ _____.

5. Weight is a type of _____.

6. A battery has influence if a light bulb glows. This is an _____ _____.

7. To learn how to graph you must learn a new _____.

8. You _____ a motor support to a pegboard.

IV. Take this form to your teacher to get corrected. Be ready to explain any of these vocabulary words to her.

Text: Biological Science: An Inquiry into Life (BSCS) pp. 240-245
Harcourt, Brace, Jovanovich

by: C.M. Chmielowski

Vocabulary Reinforcement

I. Below is a list of scrambled words. Unscramble the word and write it in the corresponding blank correctly.

1. achtrea
2. phradiagm
3. glotepitis
4. aryphnx
5. lnxary
6. chionbr
7. tionhalina
8. halexaonti
9. engoxy
10. arbonc idedixo
11. pirresation
12. thingeabr
13. calvo rdsco
14. stech vityav

_____ 1. The tube that air goes down, and which divides into two tubes further down.

_____ 2. When the muscle contracts, air comes into the lungs.

_____ 3. This flap of skin closes over the trachea to prevent food going down into the lungs.

_____ 4. This chamber at the back of the throat divides into two passages, one for food and one for air.

_____ 5. This stiff box contains the vocal cords.

_____ 6. These two tubes lead directly into the lungs.

_____ 7. Air from the outside rushes into the lungs during this process.

_____ 8. Air is squeezed out of the lungs when the diaphragm relaxes and the chest wall is lowered.

_____ 9. This chemical is used inside the cell to make possible the release of energy from glucose.

_____ 10. This waste product from cells is carried to the lungs by the blood, and the lungs exhale it.

_____ 11. Everything connected with the equation

$$C_6H_{12}O_6 + O_2 \text{ ___ } CO_2 + H_2O + \text{energy.}$$

_____ 12. Everything connected with pumping air in and out of our lungs.

_____ 13. These are found inside the larynx. Air leaving the lungs passes over them and causes them to vibrate so we can talk.

_____ 14. This gets larger when the diaphragm contracts or when the rib cage moves upwards.

Text: Natural World / 2 by: J. Wallace
Silver Burdett – Chapters 2 & 3 – Excursion 3-1.

I. Cross out one word in each row that does not relate to the others.

1. oxygen, solid, gas, liquid
2. surveyor, earth, moon, 1/6 weight
3. HCL, shell, gas, beaker
4. mass, weight, balance, grams
5. matter, particles, imagination, mass
6. hydrochloric acid, bubbles, gas, air

II. Tell what is the relationship of each set of words.

1.
2.
3.
4.
5.
6.

Text: Natural World / I
Silver Burdett – Chapter 9

by: J. Wallace

Concept: There are many forms of energy

I. Each of the scrambled words below is followed by a definition that states the meaning of the word when put in its correct spelling. Read each of the definitions and then unscramble the word to mean a word corresponding to the given definition. Write the new word on the blank given.

_____ 1.	thae	energy created when the temperature of an object increases.
_____ 2.	gtlih	energy that made the radiometer paddle wheel move.
_____ 3.	tialtenpo	stored energy.
_____ 4.	lacirtcele	energy that caused copper to coat the carbon rod.
_____ 5.	centiki	motion energy.
_____ 6.	lachcemi	energy used when you mixed copper sulfate and zinc.
_____ 7.	hemcinalac	a motor runs.
_____ 8.	grationvitaal	energy from the pull of the earth on an object.

II. *How well do you understand forms of energy?* For each type of energy give another example that is not in the book. Use your imagination.

1.

2.

3.

4.

5.

6.

7.

8.

VOCABULARY REINFORCEMENT

There are five words in each section below. Cross out the two words in each that you feel are not related to the others. Explain the relationship by titling each group.

1. _____

Midge larvae
Diatom
Copepod
Daphnia
Desmid

2. _____

Dragonfly nymph
Midge larva
White-footed mouse
Mosquito pups
Newt

3. _____

Aquatic
Herbivore
Carnivore
Terrestrial
Omnivore

4. _____

Filamentous algae
Newt
Dragonfly nymph
Desmid
Diatom

5. _____

Food web
Predator
Community
Parasite
Prey

6. _____

Aquatic
Food chain
Marine
Terrestrial
Decomposer

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APPENDIX A

Title _____ Fry Graph Readability _____

Publisher _____ _____

Evaluator _____

Science Textbook Usability Checklist

External Organizational Aids	Has none	Poor	Adequate	Good
1. Does table of contents provide a clear overview of the contents of the textbook?				
2. Do chapter headings clearly define the content of the chapter?				
3. Do chapter subheadings clearly break out the important concept in the chapter?				
4. Do topic headings provide assistance in breaking the chapter into relevant parts?				
5. Does glossary contain all the technical terms of the textbook?				
6. Are graphs and charts clear and supportive of the textual material?				
7. Are illustrations well done and appropriate to the level of the students?				
8. Is print size of the text appropriate to the level of student readers?				
9. Are lines of text an appropriate length for the level of the students who will use the textbook?				
10. Is teacher's manual available and adequate for guidance to the teacher?				
11. Are important terms in italics or boldfaced type for easy identification by readers?				
12. Are textbook questions on literal, interpretive and applied levels of comprehension?				
13. Are lab experiences integrated with text materials?				
14. Are lab questions on literal, interpretive and applied comprehension levels?				
Internal Usability				
1. Do questions raised and concepts presented show familiarity with ongoing research?				
2. Are concepts spaced appropriately throughout the text, rather than being too many in too short a space?				
3. Is an adequate context provided to allow students to determine meanings of technical terms?				
4. Are the number of examples, including lab experiences, appropriate for the level of students who will be using the text?				
5. Is the author's style (word length, sentence length, sentence complexity, paragraph length) appropriate to the level of students who will be using the text?				
6. Does the author use patterns of organization (compare-contrast, cause-effect, time order listing) within the writing to assist students in interpreting the text?				

APPENDIX B

SIMPLIFIED TECHNICAL VOCABULARY ANALYSIS CHART

Reading Selection _____ page(s) _____

Course _____ Grade ____ Teacher _____

Concept _____

	VOCABULARY TYPE				AUTHOR HELP			APPLICABLE SKILL		
Technical Term	Review Technical Vocabulary	Key Concept	Relative Value	Interesting	No Help	Indirect Help	Direct Help	Context	Structure	Dictionary/ Glossary